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REMARKS

This response is intended as a complete response to the Office Action dated May 17, 2005. In view of the following discussion, the Applicants believe that all claims are in allowable form.

CLAIM REJECTIONS

A. 35 U.S.C. §112 Claims 1-45

Independent claims 1 and 40, and their dependents, stand rejected under 35 U.S.C. §112, 1st paragraph. The Applicants respectfully disagree.

The Examiner contends that there is no support for the limitation contained in claims 1 and 40 stating providing/supplying "a plasma source power of at least about 1000 Watts and a bias power of at least about 800 Watts".

The Applicants direct the Examiner's attention to paragraph [0036] of the specification, which teaches that the second dielectric layer 208 may be etched by applying a VHF source power between 1000 and 2000 W to the upper electrode and applying a cathode bias power between 800 and 1800 W. As such, the described least source power is 1000 W and the least bias power is 800 W..

Therefore, the limitations recited in claims 1 and 40 meet the requirements of 35 U.S.C. §112, 1st paragraph and are patentable thereunder.

Claims 13-14 and 16 stand rejected under 35 U.S.C. §112, 2nd paragraph. In response, the Applicants have amended claim 13 to more clearly recite aspects of the invention. With respect to claims 14 and 16, the Applicants respectfully disagree.

Claim 1, from which claims 13-14 and 16 depend, recites in relevant part, "etching in-situ the cap layer, a trench in the second dielectric layer, the masking material, and the second barrier layer, by providing a plasma source power of at least about 1000 Watts and a bias power of at least about 800 Watts during at least a portion of step (d)". The recited source and bias power levels are required only during a portion of step (d). As such, no contradiction arises by

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limitations present in dependent claims 13-14 and 16 that recite lower bias and source powers applied only during specified portions of step (d).

Specifically, claim 13, as amended, recites a cathode bias power applied in a range from 0 to about 3000 W during at least a portion of step (d). Claim 14, restricts the source and bias powers only when etching the cap layer, and not during other portions of step (d). Claim 16, restricts the source and bias powers only when etching the masking material, and not during other portions of step (d). As such, the source and bias power levels recited in dependent claims 13-14 and 16 do not contradict independent claim 1.

Therefore, the limitations recited in claim 13-14 and 16 meet the requirements of 35 U.S.C. §112, 2nd paragraph and are patentable thereunder.

Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

B. 35 U.S.C. §103 Claims 1-17 and 40-45

Claims 1-17 40-45 stand rejected as being unpatentable over United States Patent No. 6,797,633, issued September 28, 2004, to *Jiang, et al.* (hereinafter *Jiang*) in view of Taiwan Patent 544,815 published August 1, 2003 to *Chun, et al.* (hereinafter *Chun*), United States Patent Application Publication Serial No. 2004/0161930, published August 19, 2004 to *Ma, et al.* (hereinafter *Ma*), and United States Patent 6,177,147 issued on January 23, 2001 to *Samukawa, et al.* (hereinafter *Samukawa*). The Applicants respectfully disagree.

Independent claims 1 and 40 recite limitations not taught or suggested by any combination of the cited references. *Jiang* describes a method for forming a dual damascene trench patterning method. However, *Jiang* fails to teach or suggest etching in-situ the cap layer, a trench in the second dielectric layer, in the masking material, and the second barrier layer, by providing a plasma source power of at least 1,000 Watts and a bias power of at least about 800 Watts, as recited in claims 1 and 40.

Chun discloses a process for etching a nitride layer and an oxide layer using O₂, N₂, and CF₄ in a ratio of O₂:N₂:CF₄ equal to 4-50:0-10:1. *Chun* further

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discloses applying an RF power in the range of 100 to 1000 Watts but is silent regarding any bias power applied. (*Chun*, Abstract.) As such, *Chun* fails to teach or suggest a modification of *Jiang* that would yield a plasma source power of at least 1,000 W and a bias power of at least about 800 W, as recited in claims 1 and 40.

Ma discloses a method of *in-situ* discharge prior to a plasma etch in order to avoid arcing within the chamber during the plasma etch process. (*Ma*, paragraph [0001].) *Ma* further discloses applying an RF power in the range of 100 to 1000 Watts for a 200 mm wafer and from 100 to 2000 Watts for a 300 mm wafer. (*Ma*, paragraph [0028].) However, *Ma* is silent regarding the bias power applied. As such, *Ma* fails to teach or suggest a modification of *Jiang*, alone or in combination with *Chun*, that would yield a plasma source power of at least 1,000 Watts and a bias power of at least about 800 Watts, as recited in claims 1 and 40.

In addition, although the Examiner contends that it would have been obvious to modify the etch steps of *Jiang* using the power, pressure, and flow rates as taught by the discharge sequence of *Ma* in order to avoid arcing during the plasma etch processes, *Ma* discloses that the discharge sequence is performed prior to the plasma etch process. (*Ma*, paragraph [0014]). Moreover, *Ma* specifically states that no etching of the photoresist layer or substrate occurs during the discharge sequence. (*Ma*, paragraph [0028]). As such, *Ma* teaches away from the combination being suggested by the Examiner. Instead, the combination of *Ma* and *Jiang* would result in a method wherein a discharge step that does not etch the substrate would be performed prior to plasma etching in order to avoid arcing. Thus, there is no suggestion to modify the etch steps of *Jiang* with the process conditions of the discharge sequence taught by *Ma*, in a manner that would yield the limitations recited in claims 1 and 40.

Samukawa discloses a process and apparatus for treating a substrate using an ultra-high frequency (UHF) plasma. *Samukawa* further generally discloses applying a UHF RF power in the range of 0 to 1000 Watts but is silent regarding the bias power applied. (*Samukawa*, Figs 3, 6-8, and accompanying

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text.) As such, *Samukawa* fails to teach or suggest a modification of any combination of *Jiang*, *Chun*, and *Ma* that would yield a plasma source power of at least 1,000 Watts and a bias power of at least about 800 Watts, as recited in claims 1 and 40.

As such, a *prima facie* case of obviousness has not been established because the combination of the cited references fails to yield all of the limitations recited in each of independent claims 1 and 40, and claims 2-17 and 41-45, respectively depending therefrom. Specifically, the combination of the cited references fail to teach or suggest a plasma source power of at least 1,000 Watts and a bias power of at least about 800 Watts, as recited in claims 1 and 40. In addition, a *prima facie* case of obviousness has further not been established because *Ma* teaches away from combining the references in the manner proposed by the Examiner.

Thus, independent claims 1 and 40, and claims 2-17 and 41-45, respectively depending therefrom, are patentable over *Jiang* in view of *Chun*, *Ma*, and *Samukawa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

CONCLUSION

Thus, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issuance are earnestly solicited.

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If, however, the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Mr. Alan Taboada at (732) 935-7100 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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